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Relation Between Rumination and Impaired Memory in Dysphoric Moods

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College students in dysphoric or nondysphoric moods studied pairs of words and later took a fragment-completion test of memory for targets from the pairs (under process-dissociation procedures for obtaining estimates of controlled and automatic retrieval; L. L. Jacoby, 1996). Between the study and test phases, some participants waited quietly for 7 min; others rated self-focused materials designed to invoke ruminations in the dysphoric group; and still others rated self-irrelevant and task-irrelevant materials. A dysphoria-related impairment in controlled retrieval occurred in the first 2 conditions but not in the 3rd condition. These results show that the nature of task-irrelevant thoughts contributes to memory impairments in dysphoria and suggest that self-focused rumination might also contribute to similar impairments under unconstrained conditions that permit mind wandering.

The cognitive correlates of depression and dysphoria are revealed in two distinct patterns: On the one hand, depressed and dysphoric people are quite skilled at concentrating on self-focused thoughts that seem to come to mind automatically (Ingram, 1990), and they can recall events related to their moods quite well (see the review by Gotlib, Roberts, & Gilboa, 1996). On the other hand, they report concentration difficulties (e.g., Watts & Sharrock, 1985), and their deliberate attempts to remember emotionally neutral events are impaired (see the meta-analysis by Burt, Zembar, & Niederehe, 1995). In response to these two seemingly diverse patterns, several reviews have advanced the hypothesis that the patterns are indeed related: Ruminations (perseverating self-focused thoughts) might distract attention from the task at hand and thereby impair memory for neutral material (e.g., Ellis & Ashbrook, 1988; Williams, Watts, MacLeod, & Mathews, 1988).

What sort of evidence can be found to support this hypothesis? Two studies have been conducted to examine the relation between mind wandering and memory. Watts and Sharrock (1985) asked patients with primary diagnoses of depression to report lapses of attention as they read a short story and then to listen to a different passage and recall it. The number of lapses was negatively correlated with the recall scores. Next, with a sample of nondepressed college students, Seibert and Ellis (1991b) examined the relation between letter recall and the proportion of irrelevant thoughts, which were either reported after recall or voiced aloud during recall. In both cases, the proportion of thoughts that were irrelevant to the task was negatively correlated with recall accuracy across all participants' data. Moreover, participants who had previously undergone either positive or negative mood inductions recalled fewer letters and produced higher proportions of irrelevant thoughts than did those in a neutral control group.

The results from both studies encourage the hypothesis that rumination—as one type of task-irrelevant thought—might be at least partly responsible for memory impairment, but certain characteristics of the procedures restrain the nature of the conclusions that can be reached. For example, Watts and Sharrock (1985) alerted their participants to possible concentration difficulties, first by conducting an hour-long interview on such difficulties and then by asking them to report lapses as they read, before the memory task was administered. Similarly, in Seibert and Ellis's (1991b) study, the mood-induction procedure itself encouraged the participants to voice free associations to the feelings that they were trying to establish (see Seibert & Ellis, 1991a), and this practice in mind wandering could have carried over into the memory task. Moreover, as discussed by these authors, when thoughts were reported after recall in Experiment 1, the participants might have tried to justify their relatively poor performance by writing down more thoughts. Also, when participants stopped reporting their concurrent thoughts in Experiment 2, they were reminded to think aloud. In short, conclusions about the relation between irrelevant thoughts and memory in both studies are restricted to situations in which people are directly or indirectly instructed to focus on task-irrelevant thoughts. Moreover, the two studies were not designed to examine relations between memory and the sorts of task-irrelevant thoughts that characterize rumination in negative mood states, nor do they address the possibly causal role that rumination or other irrelevant thought might play in impairing memory. My experiment was therefore designed to shed some light on the question of whether "uninstructed" rumination impairs memory in negative mood states.

Rumination should impair memory in situations that are poorly constrained. Only under relatively lax conditions of attentional control would a person have the opportunity to entertain

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self-focused thoughts that come to mind automatically. The more often that such thoughts are entertained under conditions of poor external control of attention, the more often similarly unconstrained intervals should cue their future occurrence; practice makes automatic (see Hertel, 1997).

Perhaps not coincidentally, experimental paradigms that poorly control attention are the ones that produce depressive or dysphoric impairments on tests of deliberate remembering. In the real world as well as in the laboratory, many conditions of initial exposure and later memory tests are relatively unconstrained, in that they allow room for "choice" between mind wandering and self-sustained attention to the task. Unlike other people, depressed and dysphoric people show less initiative in staying on task (see Hertel & Hardin, 1990) and might experience mind wandering during these unconstrained intervals. For example, Hertel and Rude (1991) showed that when attention to the materials during 8-s exposures was not well controlled experimentally, clinically depressed participants did not recall them as well later on as did control participants, but when the task required sustained attention during the 8 s, they recalled at least as well as did the control participants. Of related interest is the finding that attention-demanding tasks have also been shown to disrupt rumination in depressed states (Teasdale et al., 1995).

Perhaps a main reason for the central role of attentional focus in establishing impairments is that the impairments are typically found on tests that require attention to the past, such as tests of free recall. Impairments are rarely found on implicit tests of memory, on which attention to the past is not required (e.g., Hertel & Hardin, 1990; Watkins, Mathews, Williamson, & Fuller, 1992; but see Hertel, 1994), and their occurrence on recognition tests is spotty (see Watts, Morris, & MacLeod, 1987). Recognition has been shown to reflect two separable components of retrieval (Jacoby, 1991): an automatic component, akin to what some researchers term *implicit memory,* and a more controlled or recollective component, of the sort that dominates performance on explicit tests such as free recall. By using Jacoby's process-dissociation procedure to estimate each component separately, Hertel and Milan (1994) showed that only the controlled component of recognition was impaired in a dysphoric sample. The controlled component of recognition and other memory tests reflects the degree to which attention is focused on the past; it is uncontaminated by reliance on automatic retrieval. Therefore, process-dissociation procedures were built into the design of my experiment, as a means of providing a more sensitive measure of impairment.

The design of this experiment was modeled in part on experiments reported by Jacoby (1996). In Phase 1, related and unrelated word pairs were presented at a fast rate; participants read them aloud and were asked to try to remember them for a later test. Phase 3 was a fragment-completion test, in which inclusion and exclusion instructions from the process-dissociation procedure were used to obtain estimates of the two components of memory. On this test, word fragments appeared with the related context word that some participants also experienced in Phase 1 (e.g., *knee b_n_*).[1] The logic of the process-dissociation procedure for fragment completion is described next.

On each test trial, a context-fragment pair was presented with one of two types of instructions: inclusion ("use old") or exclusion ("use new"). On "use old" trials, participants were told to complete the fragment with a word they remembered from Phase 1 or, if they failed to remember such a word, to complete the fragment with the first word that came to mind that fit the fragment and is related to the context word. If controlled and automatic bases for retrieval are assumed to be independent, the probability that a target word from Phase 1 (e.g., *bone*) will be produced under "use old" instructions can be expressed algebraically as $C + A(1 - C)$. This algebraic expression means that either the target is retrieved in a controlled, recollective manner (C) or, in the absence of such controlled retrieval ($1 - C$), it is automatically retrieved (A). In contrast, on "use new" trials, participants were told to try to remember such an old word but to complete the fragment with a new word (e.g., *bend*) that is related to the context word. In this case, the probability that an old word from Phase 1 would be used *erroneously* to complete the fragment is a function of that word's coming to mind automatically in the absence of its controlled retrieval: $A(1 - C)$. To obtain an estimate of controlled retrieval for each participant, the proportion of Phase 1 targets used erroneously on "use new" trials is subtracted from the proportion of targets used correctly on "use old" trials, because $C = [C + A(1 - C)] - A(1 - C)$. Then estimates of A are obtained by substitution. These estimates for each participant served as the dependent measures of memory for assessing impairments associated with dysphoria and the effects of the Phase 2 manipulation, which is the essential part of the design for addressing the claim that rumination causes impairment.

One purpose of Phase 2, the interval task, was to determine whether a dysphoria-related impairment in controlled retrieval would be found after a completely unconstrained interval of 7 min between study and test. Such an interval was expected to provide ample opportunity for ruminations that would carry over into the test phase. Another purpose was to assess the likelihood that rumination would be responsible for poor controlled retrieval in this unconstrained condition. To this end, an interval task that encouraged rumination (the self-focused condition) was included, as was a control condition in which participants thought about task-irrelevant and self-irrelevant matters (the neutral condition). Such irrelevant thoughts were presumed not to carry over to the test.

The self-focused and neutral conditions were based on research by Nolen-Hoeksema (e.g., Nolen-Hoeksema & Morrow, 1993). In a variety of studies, she examined the effects of rumination or distraction on momentary mood in depressed or dysphoric participants, in comparison with nondepressed or nondysphoric control participants. Unlike the control participants, depressed and dysphoric participants who were asked to contemplate self-focused phrases (e.g., *my character and who I strive to be*) experienced an increase in negative moods, as revealed by rating scales, and those who were asked to contemplate neutral statements (e.g., *the way the Grand Canyon looks at sunset*) experienced a decrease. In other words, rumination

[1] The manipulation of relatedness in Phase 1 was used as a means of replicating Jacoby's (1996) finding that reinstating the related context on the test increased both components of fragment completion: The same context helps make the solution to the fragment come to mind automatically and helps conscious recollection of its prior occurrence.

and distraction exerted opposite effects on mood (also see Fennell, Teasdale, Jones, & Damle, 1987). These materials therefore seemed suitable for investigating effects of rumination on memory, in spite of the possible confounds invited by the other ways in which they differed (e.g., concreteness). Therefore, dysphoric and nondysphoric participants in this experiment were assigned to one of the three conditions of the interval task (unconstrained, self-focused, or neutral). To keep attention focused appropriately in the latter two conditions, the participants were asked to rate the clarity of the idea suggested by each phrase. The primary prediction was a finding of similar differences in estimates of controlled retrieval between dysphoric and control samples in the unconstrained and self-focused conditions and a smaller difference in the neutral condition. Corresponding differences in the automatic component of retrieval were not expected.

Method

Participants and Design

To categorize participants according to mood states, the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) was administered in introductory psychology classes at Trinity University. Because indications of anxiety, hostility, and depressed moods often coincide, the participants in this study are referred to as dysphoric or nondysphoric, to denote general unpleasant mood state or the lack of such a state. The scorer (author) gave the participation codes of students who scored 6 or below and 9 or above to the experimenters, who then consulted a code/name list and a general phone pool list and phoned to request participation in the experiment. The experimenters did not know the BDI scores, and the scorer did not have access to the code/name list. The scorer randomly assigned the codes to experimental conditions, under the constraints of equal cell sizes within each mood group and gender.[2]

The final sample included 36 dysphoric participants and 54 nondysphoric participants. One third of each mood group was assigned to each condition of the interval task (unconstrained, self-focused, and neutral); each combination of mood group and interval task was exactly balanced on gender and on the counterbalancing conditions for the study and test materials.

Materials

Study and test lists. Ninety sets of materials were selected from those used by Jacoby (1996). Each set consisted of a context word and two additional words, each of which was associatively or semantically related to the context (e.g., *knee. bend. bone*). Because the two additional words shared at least two letters in the same position (e.g., b_n_), they could each be used to complete the word fragment on the test. However, only one of the additional words in each set was selected for presentation as the target during the study phase. The second additional word—the alternate—was available for completing the fragment under "use new" instructions.

Fifteen sets were assigned to each of six lists by balancing the lists on the mean frequency of the context words, target words, and alternates and on the mean baseline completion rates for the target word and alternate, according to Jacoby (1996). These six lists were rotated across the six cells of the within-subjects design.

One within-subjects variable was the study condition. During the study phase, participants were exposed to 30 related word pairs (e.g., *knee bone*) and 30 unrelated word pairs (constructed by re-pairing the contexts and targets within two of the sets of 15; e.g., *knee truth* and *king bone*). The remaining 30 pairs were reserved for new test items. Study List A consisted of Lists 1 and 2 as related pairs and Lists 3 and 4 as unrelated pairs; Study List B contained Lists 3 and 4 as related pairs and 5 and 6 as unrelated pairs; Study List C contained Lists 5 and 6 as related pairs and Lists 1 and 2 as unrelated pairs.

The other within-subjects variable was test instruction. On one test list, pairs from the odd-numbered lists (1, 3, and 5) were accompanied by "use old" instructions and the others (from Lists 2, 4, and 6) by "use new" instructions. The other test list contained the reverse pattern.

Each study list of 60 word pairs was ordered randomly within the constraint that three pairs from each list (e.g., Lists 1, 2, 3, and 4 for Study List A) appeared in each block of 12 pairs. Three additional buffer pairs appeared at the beginning and at the end of each list. These orders were fixed across participants assigned to each list.

Each test list contained all 90 pairs of context words and fragments (e.g., *knee b_n_*) in a fixed order. The order was determined by randomly selecting three items from each of the six lists to appear in each block of 18 items. Because of experimenter error, one list was preceded by six buffer items (two old related, two old unrelated, and two new) and the other by two additional old related items. The old items among the test buffers were taken from the study buffers. The two lists were otherwise identical, except for the previously described reversal of instructions between items on Lists 1, 3, and 5 and items on Lists 2, 4, and 6.

Phrases for the interval tasks. In the self-focused and neutral conditions of the interval task, participants rated the clarity of 40 ideas suggested by phrases. The phrases were taken from Nolen-Hoeksema and Morrow's (1993) study and modified to exclude words appearing in the memory task or high associates of those words.[3] The order within each list was fixed, and some portion of the list was repeated, as needed, to fill the 7-min interval.

Procedure

First, participants were told that they would see a series of word pairs presented on the monitor and were asked to try to remember them for a later memory test. The pairs were presented at the center of the screen in white lowercase letters on a black background. The exposure duration was 2 s, with a 500-ms interstimulus interval. In each interval–task condition, 4 dysphoric participants and 6 nondysphoric participants viewed each of the three study lists.

Next, the participants in the unconstrained condition were asked to sit quietly in a chair on the other side of the room, while the experimenter ostensibly readied the next task. Instructions mentioned that they could think about whatever they liked but should not talk, read, or do other work. Participants in the self-focused and neutral conditions were instructed to use their imagination and concentration to focus on the idea suggested by each of a series of phrases and then to rate (on a 5-point scale) the clarity of that idea. On each trial in this rating task, the phrase appeared for 4 s in the center of the monitor and was followed by an instruction to rate the clarity of the idea that it suggested. After instructions, the experimenter moved to the other side of the room and read or worked quietly while the participants paced themselves through the task.

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[2] Data from 14 participants were replaced because their BDI scores at the end of the experimental session were out of the initial range of the first administration. The data from 5 other participants were also replaced: One was not fluent in English, 1 had difficulty staying awake, 1 encountered a computer mishap during the session, and 2 clearly misunderstood the instructions.

[3] Examples of phrases in the self-focused condition were *what it would be like if your present feelings lasted; your character and who you strive to be;* and *your physical appearance.* Phrases from the neutral condition included *the layout of the local post office; the way the Grand Canyon looks at sunset;* and *the pattern on an Oriental rug.*

For the typical participant, the phrases were exposed for at least half of a second cycle through the list, before the interval timed out.

Instructions for the test phase began 7 min after the start of the instructions for the interval task. The experimenter used examples to explain the instructions for "use old" items and "use new" items. Participants were told that if the instruction for the item was to use an old word, they should try to remember a word from the study phase that both completed the fragment and is related to the context word. If they could not remember such a word from the study phase, they were to use the first word that came to mind that fit the fragment and the context. If the instruction accompanying the pair was to use a new word, they were to try to remember an old word but not use it to complete the fragment; instead, they were to use a new word that fit the fragment and the context. If they could not think of such a new word, they could report the old word as a last resort and then say "old," but the experimenter stressed the importance of trying to think of a new word. Finally, for both sets of instructions, participants were also told that some of the old words did not appear with the current context word during the study phase.

The test items were presented in white lowercase letters in the center of a black background, on the same line after an instruction ("USE OLD" or "USE NEW"). The participants responded aloud, and the experimenter noted the response, out of view. The exposure duration for each test item was 10 s; after the item disappeared, the experimenter waited a short interval, to allow participants to respond if they had not previously done so, before advancing the program to the next item.

After the memory test, the experimenter presented a packet containing the BDI, other forms, and an envelope. The participants were assured that the experimenter would not see the contents of the envelope, which they sealed after completing the forms. They were then debriefed about the nature of the memory task. Last, the participants in the self-focused condition were each shown clips from "Saturday Night Live" for approximately 7 min.

Results and Discussion

Separate analyses of variance (ANOVAs) were performed on each of the dependent measures indicated by the headings that follow. Effects either not reported or reported as nonreliable were accompanied by p values greater than .10. Reliable main effects that were qualified by reliable interactions are reported without accompanying statistics. All overall analyses were performed with gender as a variable; when this variable did not qualify any of the reliable effects, the data were collapsed across gender in the reported analyses.

Target Proportions (Base Rates)

The "raw" dependent variable in the memory task was the proportion of trials in which the participant produced a target word for the fragment.[4] This measure serves to index baseline performance on fragments for words not presented in Phase 1 (new fragments); it was evaluated in an ANOVA with between-subjects variables for group (dysphoric and nondysphoric) and interval task (unconstrained, self-focused, and neutral) and a within-subject variable for instructions ("use old" vs. "use new"). The means are reported in the top section of Table 1.

In this analysis of base rate responding, the main effect of instruction was reliable, but it was qualified by a reliable Instruction × Group interaction, $F(1, 84) = 6.56$, $MSE = 0.0068$, $p < .05$. The nondysphoric participants produced an average of .26 targets in each instructional condition. The dysphoric participants, however, produced more targets when they were asked to used an old word (.30) than when they were asked to use a new word (.23), $F(1, 33) = 19.20$, $MSE = 0.0048$, $p < .001$. This difference suggests that they performed more conservatively when asked to use a new word, and it violates the assumption regarding independence of the controlled and automatic components of retrieval (see Curran & Hintzman, 1995). The effect of this violation is to render uninterpretable the estimates of automatic (but not controlled) retrieval in the dysphoric group (see Jacoby, 1998). In this regard, it is also important to know that reliable main or interaction effects of the interval task were not obtained in base rate performance.

When instructions to use old or new words are used in the process-dissociation procedure, an analysis of the full design for target proportions is uninformative, and so it was not performed. However, the proportion of targets used on "old" trials, the means for which are presented in the lower section of Table 1, entered into the analysis of estimates of controlled retrieval.

Estimates of Controlled Retrieval

Two estimates of controlled retrieval were computed for each participant. Each estimate—one for targets presented with their related context words in Phase 1 and the other for targets presented with an unrelated context word in Phase 1—was computed by subtracting the proportion of targets erroneously used on "use new" trials from the proportion correctly used on "use old" trials. These estimates were then submitted to an ANOVA with between-subjects variables for group and interval task and a within-subjects variable for relatedness of the pairs in Phase 1.

The reliable main effect for group[5] was qualified by two interactions. First, dysphoria-related differences in controlled retrieval depended on the interval task, $F(2, 84) = 3.11$, $MSE = 0.039$, $p < .05$. Figure 1 depicts the mean estimates, collapsed across relatedness. As was found by Hertel and Milan (1994), a dysphoric deficit (.20 vs. .32) was obtained in the unconstrained condition, in which participants merely waited for 7 min, $F(1, 28) = 5.59$, $MSE = 0.038$, $p < .025$. This deficit also occurred in the self-focused condition and disappeared in the neutral condition. In light of the rationale for the design, however, the interaction is best viewed in terms of the outcomes of two interaction comparisons: The interaction of group with the comparison between unconstrained and self-focused conditions was

[4] There were 15 fragments for each cell of the within-subjects design of relatedness by instruction. However, because of experimenter error, Study List B presented two alternate words (instead of target words) during Phase 1, one of which was tested in under instructions to "use old" and the other under instructions to "use new." These fragments were omitted in the scoring reported here, so that proportions out of 15 fragments were scored for four of the cells, and proportions out of 14, for the other two. The patterns of reported results were nearly identical when all 15 were scored (including the two targets that varied across the study lists).

[5] The finding of base rate differences in the dysphoric groups suggests that the dysphoria-related differences in controlled retrieval are underestimated. The dysphoric participants' more conservative approach to the exclusion trials, coupled with their more liberal performance on inclusion trials, exaggerates their estimates (see Jacoby, 1998).

Table 1
Mean Target Proportions

Condition	Dysphoric			Nondysphoric		
	Free	Self	Neutral	Free	Self	Neutral
New fragments						
Use old instructions	.28	.32	.31	.25	.25	.29
Use new instructions	.22	.24	.24	.27	.25	.25
Old fragments						
Use old instructions	.49	.45	.52	.51	.55	.54
Use new instructions	.29	.22	.18	.19	.19	.23
n	12	12	12	18	18	18

Note. *Free* (unconstrained), *self* (self-focused), and *neutral* refer to the conditions of the interval task.

not reliable ($t < 1.0$), but the interaction with the comparison between unconstrained and neutral conditions was indeed reliable, $t(56) = 2.06$, $p < .05$. These interaction comparisons were chosen a priori on the grounds that the two distracting conditions should reveal something about what might be responsible for the deficit in the unconstrained condition. In this regard, the overall Group × Interval Task interaction suggests that controlled retrieval in a state of dysphoria is disrupted by focusing on oneself instead of on other task-irrelevant information.

Group differences in estimates of controlled retrieval also depended on whether the targets had been presented with the same related context word or a different word in Phase 1, $F(1, 84) = 4.43$, $MSE = 0.023$, $p < .05$. (The main effect of relatedness was also reliable.) The dysphoric deficit was larger for related targets (.35 for dysphoric and .48 for nondysphoric participants) than for unrelated targets (.16 for dysphoric and .19 for nondysphoric participants). This interaction probably reflects floor effects in controlled retrieval when the context was not encountered with the target initially.

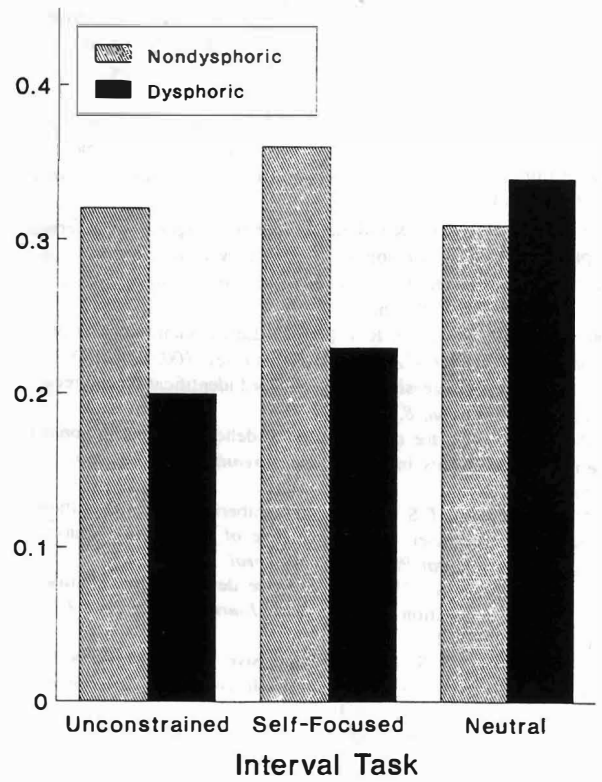

Figure 1. Mean estimates of controlled retrieval in each combination of group and interval task.

Estimates of Automatic Retrieval

Estimates of the automatic component of retrieval were also computed separately for related and unrelated pairs. Because of the previously described differences in base rates across instructions in the dysphoric group, an ANOVA on the estimates in the nondysphoric group was performed, with a between-subjects variable for interval task and a within-subjects variable for relatedness in Phase 1. Only the main effect of relatedness approached statistical significance, $F(1, 51) = 3.18$, $MSE = 0.017$, $p < .10$. Mean estimates were .31 for related pairs and .27 for unrelated pairs. Furthermore, only the related pairs showed true automatic influences of Phase 1 exposure above the base rate target production of .26, $F(1, 51) = 4.29$, $MSE = 0.016$, $p < .05$.

BDI Scores

These scores were used to verify the dysphoric state of participants who were preselected according to scores on the initial administration and to determine whether participants' moods differed across the three interval conditions. In the latter regard, the dysphoric participants in the neutral condition scored at least as high, on average, as did the others, even though their estimates of controlled retrieval were much higher. Mean BDI scores in the dysphoric groups were 16 (unconstrained; $SD = 6.5$), 15 (self-focused; $SD = 4.3$), and 17 (neutral; $SD = 6.9$). The ANOVA on scores in the dysphoric group revealed only a reliable gender difference, $F(1, 30) = 5.87$, $MSE = 30.30$, $p < .025$: Women produced higher scores ($M = 18$) than did men ($M = 14$). Mean BDI scores in the nondysphoric group were 3 (unconstrained; $SD = 2.3$), 3 (self-focused; $SD = 1.9$), and 2 (neutral; $SD = 2.1$), and no reliable differences were obtained.[6]

[6] In the initial class administration, BDI scores of participants in the final dysphoric sample ranged from 9 to 44; on the end-of-session administration they ranged from 9 to 35. The scores of 6 participants

General Discussion

As Hertel and Milan (1994) found in recognition, dysphoric participants' controlled retrieval was impaired, in relation to that of control participants, when the interval between study and test was unconstrained. A similar degree of impairment was experienced by participants who performed the self-focused task during the interval, and the impairment was eliminated by asking participants to spend the interval thinking about self-irrelevant matters.

A comparison of performance after the two rating tasks suggests that the nature of thoughts during retention intervals contributes to impairments in controlled remembering. Although, on a priori grounds, other differences between the cognitive processes invited by the two sets of phrases might affect later performance, it is difficult to argue that such effects would confound performance in the dysphoric groups only. Estimates of controlled retrieval did not differ reliably across the conditions of the interval task in the nondysphoric group.

The rationale for the rating-task manipulation in Phase 2 was to provide two possible analogues for thoughts experienced in the unconstrained interval (self-focused thoughts or self- and task-irrelevant thoughts). Estimates of controlled retrieval in the self-focused condition show a dysphoria-related deficit that was similar to the pattern in the unconstrained condition. It is clearly not certain that the dysphoric participants in the unconstrained condition entertained ruminative thoughts that impaired control. Even if self-reports had been requested from participants in this condition, however, the outcome would be merely correlational and possibly contaminated by reconstructive recall and demand characteristics as a function of individual performance on the test. Furthermore, a request for self-reports at the end of Phase 2 was judged to be intrusive and possibly influential at the time of the test. In short, there seems to be no uncontaminated method for establishing a causal link between uninstructed rumination and impairments in controlled retrieval. However, because the findings in the two other conditions of the interval task permit the causal inference regarding rumination and controlled retrieval, they provide converging evidence for the hypothesis that rumination in unconstrained intervals contributes to impairments in deliberate memory.[7]

Finally, in light of previous findings of a relation between task-irrelevant thoughts and memory performance, it is important to speculate about whether the current results with dysphoric students would also be found in depressed samples. Should self-focused rumination be expected to be the only type of task-irrelevant thinking to impair control in depression? Evidence for prefrontal hypoactivation in depression (e.g., Henriques & Davidson, 1991) suggests that depressed people should have trouble sustaining and switching attention, regardless of whether potentially distracting materials are self-relevant (see Hertel, 1997). Moreover, such a general deficit in attentional control should be correlated with severity of depression (see Johnson & Magaro, 1987) and not necessarily found in samples of dysphoric college students. Truly depressed people experience a high proportion of self-focused thoughts (Ingram, 1990), but such thoughts might merely characterize the nature of typical distractions; they might be sufficient but not necessary causes of difficulties in refocusing attention on the past as more profoundly depressed people try to remember.

remained the same across administrations. 10 scores increased, and 20 decreased. At the end of the session, only 1 participant scored 9, 4 scored 10, and 2 scored 11.

[7] That the results from the self-focused and neutral conditions were mediated by mood might be argued on the basis of Nolen-Hoeksema and Morrow's (1993) findings in mood ratings after these tasks. In my experiment, the end-of-session packet contained scales for rating momentary feelings of depressed mood. Along with BDI scores, those ratings showed that after the test, the dysphoric participants in the neutral condition reported feeling at least as depressed as did those in the other two conditions. More in general, advancing a mood-mediation explanation of the results entails a potentially circular explanation of how negative moods impair memory. The more parsimonious approach is to assume that rumination can temporarily exacerbate negative moods and, independently, carry over to impair controlled retrieval.

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